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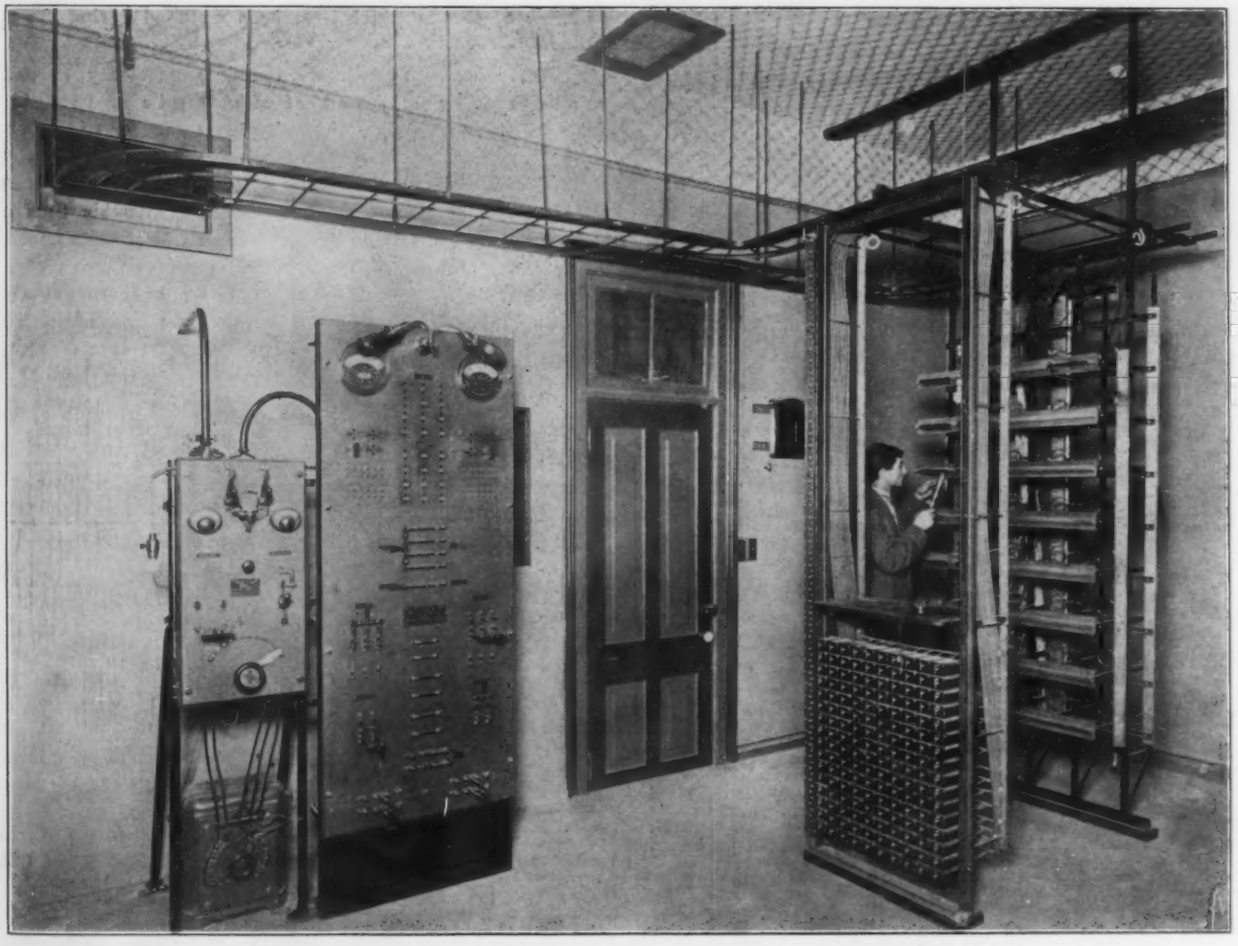
VOLUME XXI. SAN FRANCISCO, DECEMBER 12, 1908 NUMBER 24

ANACONDA TELEPHONE PLANT

An example of commendable foresight in installing a first-class equipment of telephone service for a small town, which is destined to grow to be a large one, is exhibited in the Anaconda telephone plant of the Montana Independent Telephone Company. The plant has been recently completed and the present satisfactory service, as well as its future possibilities, is gaining many friends for the Independent movement in Montana. No expense has been spared in putting in the very best station apparatus, even though the work was done during the period of hard times just passed. The outside construction is also up to the high standard set by this company and is so arranged as to take care of the growth of the town for the next ten years.

The installation makes immediate provision for 160 local subscribers. As may be seen from the picture, the exterior of the office is neatly designed and well constructed. It houses not only the executive offices of the company, but also the switchboards and power apparatus.

The switchboard is of the full common battery multiple type, being arranged with three positions and a cable turning section. Direct current for charging the battery is obtained from the alternating-current power lines by means of a mercury rectifier. The multiple board places the line terminal or jack for every line within direct reach of every operator. This is accomplished by providing each line with a plurality of jacks, these jacks appearing in a similar position in each section of the board.



Power Switchboard, Mercury Rectifier and Apparatus Frames in Anaconda Telephone Plant

As shown in the picture, the first position has been left blank to be used as a multiple annex; the second position is arranged for toll work; the third position contains the terminals of the local subscribers' lines, 160 in number.

It was a radical move when the switchboard was planned so as to place a small number of lines on this type, but the wisdom of General Superintendent H. E. Burch is now clearly shown, as another section and position will soon be necessary.

Exterior Anaconda Telephone Plant, Montana Independent Telephone Co.

Every arrangement on the board has been made to facilitate rapid service. The line circuits are equipped so as to give a clean line for operation to the harmonic party line, and the cord circuits are each equipped with an individual indicating four-party key. The board is so arranged with pilot signals for both line and cord signals, and a switching key that will throw the positions together if so desired.

Full Common Battery. Multiple Type Switchboard of Anaconda Telephone Plant

As can be seen from the large picture, the power switchboard, mercury rectifier and apparatus frames are all placed in the same room in the rear of the building. The power board is so arranged that individual cell readings can be had on the volt meter. The board is also arranged with duplicate batteries, duplicate ringing machines, and a mercury arc rectifier.

The switchboard and telephone equipment were furnished by the Dean Electric Company, of Elyria, Ohio, the apparatus embodied in the sections and plants being identical with that installed at Detroit.

VALUE OF THE TELEPHONE TO SMALL COMMUNITIES.

The telephone system recently installed at Vallejo, Cal., by the Western Electric Company has been the subject of favorable comment from the local press. As stated in the Vallejo "Chronicle" the telephone has long passed the stage when it was a luxury to be enjoyed by the well-to-do and has become a necessity not only to public institutions and private enterprises, but to the home as well. The telephone of today is a servant to the city and the people, and a very useful servant it is. Every public building is equipped with telephones, which are always busy taking care of the city's affairs. We find them in all the departments of the city hall, in the fire department's quarters throughout the city, in the schools and hospitals, the police department, and in the office of the water and light companies; and these public institutions would be at sea if their telephone connections were cut off for an hour. While the city finds it an absolute necessity, the average citizen finds it just as essential to his welfare. This is evidenced by the large number of phones which have been installed during the past year in private homes.

A few years ago, if we found it necessary to call a physician, it meant a walk of often a mile or two. If he was not in when we got there, it meant another trip to some other physician. Today we reach his residence by phone in a few seconds, and if he is out, we call up another one in the same length of time, thus saving valuable time and allowing us to remain at home. We find we need something from the store or market in a hurry, and still cannot find time to go for it. Without a phone we have to get along without it, but with one we can call up and have goods delivered to us without losing any time. In case of rain or bad weather, the telephone proves to be the housewife's best friend. One woman in speaking of her telephone calls it "her friend on the wall." Our most distant friends are always within call and in case of need can be summoned at a minute's notice. As a social aid, the telephone is society's best friend. Every day, invitations are issued over a phone and arrangements made for these delightful informal parties and gatherings. Without a telephone, these informal affairs would be difficult.

The business man already knows the value of a telephone to him and it is not a question of having a telephone, but a reliable telephone, that interests him. Many important deals are now closed daily over the telephone and important matters involving thousands of dollars are decided after a conference over the phone between two men who may be at the time hundreds of miles apart. A reliable telephone and good service are necessary then.

SUCCESSFUL SELECTIVE RINGING OVER LONG LINES.

The Colusa County Telephone Company, of Colusa, Cal., operate an eight-party line that is 50 miles long. The closest telephone is about 8 miles from the exchange and the farthest is 50 miles from the exchange. They work four parties to ground on either side of the line with absolute satisfaction. The system used is the four-party harmonic, four bells being legged to ground from either side of the line. When it is realized that only the bell of the party desired rings, and that there is absolutely no special mechanism in the telephone, the commercial importance of such an operating line is realized.

PRACTICAL TELEPHONE UNITS AND STANDARDS.*

By Gerald Deakin.

Any connected system, not a monopoly, which is to be permanent and successful to the highest degree, must be built along economic and scientific lines. This may be readily deduced from the generally accepted theory of the survival of the fittest. A system constructed along any other lines will not give the maximum possible returns for the money invested. No one, I believe, will dispute this point, or argue that money should be spent in any other way.

We may now ask ourselves this pertinent question: Is the independent telephone system as a whole and generally speaking built and being built along strictly economic and scientific lines? An answer in the affirmative cannot truthfully be given. At least one reason for this is obvious. There is today no recognized system of units and standards to guide and assist in planning construction and in making comparisons, to gain a desired end in the most economical manner when all viewpoints are considered. The result is that the different parts of the system are not always built with due regard to other associated parts or to the system as a whole. How often have all of us used and heard the now common phrase, "Let's do this to be on the safe side"! This, in reality, is nothing more nor less than an unintentional admission of the fact that we are not in possession of sufficient information to do otherwise, or, in other words, we are spending more money than is probably actually necessary to obtain the desired results.

There are, of course, many problems which at the present period of our development in the science of telephony cannot be solved in strictly scientific fashion. This, however, does not excuse non-scientific methods where others are possible and practicable, and it should be remembered that the difference between possible and practicable is too often only a matter of personal opinion.

Let us consider for a moment one of, if not the most, important piece of telephone equipment, the subscriber's set. How much generally is known about its transmitting and receiving qualities, and about the relative merits of the different forms in which it now appears? Here is the natural starting point of all transmission studies, and if there is anything about which accurate information is necessary, it is the subscriber's set. Planning a telephone toll or trunk line without knowing something about the qualities of the sub-station equipment is, in a degree, like planning a power transmission line without knowing the characteristics of the generator. There are now in common use many different forms of common battery sub-station circuits, each of which is claimed by its respective manufacturer to be at least equal to any on the market, and in many cases a claim of absolute superiority it made. These claims should carry no real weight, unless substantiated by a tangible proof, which, at this time, with the present lack of accepted standards, would be unsatisfactory and difficult to give. While comparisons might show that most modern forms of subscribers' sets, when properly used under the particular conditions for which they are designed, are, in all essential respects, equal, it is not, however, in accordance with good engineering practice to consider such to be the case, without first making such comparisons.

In the same manner, we may refer to the various forms of central office and private exchange equipment now in common use.

To grasp the real importance of being able to handle intelligently all losses occurring in various parts of a telephone system, it is only necessary to consider the problems presented in any large city, to say nothing of the long-distance plant. Here we are at once brought face to face with the fact that the grade of transmission, under severe conditions, falls rapidly as the distance to be covered increases. The dissipation of energy occurs to a greater or lesser extent in all of the three principal divisions of an exchange system, namely, the wire plant, the central office plant, and the sub-station plant, including private exchanges. It is well known that the most economical arrangement of any system is one in which a gain in transmission cannot be obtained more economically by improving one portion in preference to another. It is obvious, therefore, that if such an arrangement is to obtain, we must know the magnitude and extent of all losses. If we do not know this, we cannot reduce the cost of construction to a minimum. If, on the other hand, we do know the real value of all losses, it is then a simple matter to determine for a given standard of transmission the most economical construction for each of three principal divisions of an exchange or long-distance system.

The relative transmission efficiency of each of the various forms of open-wire and cable construction is now well known and is commonly expressed in terms of some arbitrary unit of measurement, generally a cable of known electrical properties. Just what the standard unit of measurement should be is, I believe, one of the first things that should be agreed upon by this association. In the electrical laboratories of some of the large manufacturing companies, this system of measurement has also been quite extensively used, and with good results, in recording transmission losses originating in circuits and apparatus. Assuming, therefore, that the efficiency of all telephone appliances can be determined with a fair degree of accuracy, why should not such information be used in describing and cataloging apparatus and circuits? If this were generally done, it would be of the greatest benefit to all. It would enable engineers to specify what the allowable loss in any particular class of circuit or apparatus should be to obtain a desired result in the most economical manner. It would also tend to establish a proper basis upon which to purchase equipment, which is now so often purchased solely from a first cost viewpoint, little attention being given to the real merits of the different equipment obtainable. This, I believe, is a very important point, and one which is of particular importance to all operating companies, especially those deeply interested in long-distance service.

The work of determining a standard unit of measurement, as well as the method of making comparisons, is, I believe, distinctly the work of a committee representing equally all interests, and I recommend that such a committee be appointed by this association.

Assuming that it should be decided to give the transmission efficiency of all telephone appliances and circuits in terms of some arbitrary unit, such as a cable of known properties, it then remains for the committee, so far as standard units are concerned, to prepare specifications covering the following: First, the electrical properties of the standard cable and a detailed description of the way its equivalent should be manufactured and operated in artificial form so as to be commercially practicable for laboratory work. For the information of those who are not already aware of the fact, I would say that the Bell Company has for a number of years considered as their standard of measurement a No. 19 B. & S. cable of .06 mutual capacity. This cable is usually made up in artificial form in 16 and 32 mile lengths, each consisting of a number of small sections in series on the order of the rheostat in the ordinary Wheatstone bridge.

If we had but one form of subscriber's set to deal with, the second standard would not be required, but unfortunately we have not. It therefore becomes necessary to decide upon some standard form of sub-station circuit and equipment with which all other sets may be compared, the difference being expressed in terms of the standard unit of measurement. As a suggestion, I would recommend the

* Paper presented at Convention of International Independent Telephone Association, Chicago, Dec. 1, 2, 3, 1908.

adoption of some particular form of local battery sub-station set as a standard. This set would be manufactured and operated strictly in accordance with specifications prepared by the committee. Investigation may show that a particular form of common battery set is preferable to a local battery set. This, however, is a point that should be settled without great difficulty.

From the foregoing it may be said that there are primarily required two standards, the first of which might be called the practical unit of measurement, and the second, the practical unit of power.

Following the establishment of the above standards would come the establishment of standard methods of comparison. This is a subject on which suggestions from all quarters would be of great benefit. It is needless to say that any methods that might be determined upon should be wholly fair to all and should not place any equipment or apparatus in circuit conditions for which it was not designed or intended. It is more than probable that a particular method of making comparisons will not be the most suitable for all classes of equipment; for example, in determining the efficiency of a subscriber's set, that is, the combined efficiency of the receiver, transmitter, and sub-station circuit, it is equally important that both the intensity and quality of the transmitted speech be taken into consideration. This would apparently exclude the use of any method not employing the human ear as a final means of determination. On the other hand, the efficiency of repeating coils, condensers, and circuit combinations of other apparatus might be better determined, for all practical purposes, by some method employing an alternating current of known frequency and wave form, measured by a sensitive instrument. Where this latter method can be employed, it is preferable to the former, in that the personal equation is removed from the result. It might be well to point out here that the transmission loss caused by the introduction of a piece of apparatus in or on a talking circuit depends largely upon the position which the apparatus occupies with relation to the rest of the circuit. It is the position, as well as the quality of a piece of apparatus, which controls, to various degrees, the reflection losses, which losses are generally much more noticeable in cable circuits than in open wire circuits. It should be further understood that the total loss caused by a combination of a number of pieces of apparatus may not be the same as the combined loss calculated from the individual losses, such as would be caused by each piece of apparatus, if placed in or on the circuit separately. For this reason, the conditions under which a rating applies, should always be given or understood.

The above are only a few of the many details which must be considered by a committee, if this matter is to be satisfactorily solved.

There is another feature entirely apart from the actual efficiency of the various forms of construction, which also should receive the most careful consideration on the part of this association, and that is the proper standard of transmission for which all construction should be planned. This would not be so serious a matter if all exchanges were not more or less interconnected by long-distance lines. If we were to have satisfactory communication between distant points, it is essential that the circuits and equipment be efficient, and, at the same time, if plants are to be profitable, they must be built along economic lines.

By the term "standard of transmission" is meant the grade of transmission between any two points, and may be defined by that given by two standard subscribers' sets or other unit of power, over a definite length of standard cable or other unit of measurement. The standard of transmission, for exchange work, from a transmission view-point, does not affect the independent system, as a whole, and therefore, may be determined for each exchange, without reference to long-distance service. The one object of determining this transmission standard would be to facilitate the manufacture of equipment; that is, all manufacturers could then proceed with the designs of their various equipment with a more or less definite understanding as to the allowable loss. In long-distance service, however, the standard of transmission must be definitely understood by all, if the system as a whole is to be constructed in the most economical and efficient manner. This, of course, includes the subscriber's local loop, but not local trunk lines, unless such are used for toll trunking purposes. It is obviously unfair to the independent system as a whole, to spend large sums of money to make the toll lines efficient, when, by a much smaller expenditure of money, a considerable increase in efficiency could be made in the exchange and way-station equipment. I do not mean to say that all equipment is now not as efficient as it might economically be, but I know of many cases where it is not. For example, I have in mind a case of a particular toll line some 400 miles long, over which the grade of transmission was found to be approximately equal to that which would obtain over 800 miles of the same-size wire, providing the terminating exchange, including the transmitting and receiving loop and way-station losses could be eliminated. From this it will be seen that approximately one-half the total transmission loss occurred at the latter points. It was found, upon investigation in this particular case, that with a little expenditure of money, this loss could be reduced some 200 miles, thus increasing the standard of transmission from 800 to 600 miles.

It should be noted at this time that a standard of transmission cannot be determined without first standardizing the unit of power. For example, a 1,000-mile (No. 8 B. W. C. copper) standard with one type of subscriber's set might be equivalent to an 800-mile standard with less efficient subscriber's sets, and vice versa.

The units and standards which it is herein recommended be determined by this association may be briefly summarized as follows:

First: A unit of measurement, such as a cable of known electrical properties.

Second: A unit of power for speech transmission tests, such as a standard local battery subscriber's set.

Third: Methods of making comparisons between or rating similar apparatus and circuits.

Fourth: A standard of transmission for long-distance service.

Fifth: The most economical standard of transmission for exchange service. (This latter recommendation to be considered more in the light of a guide than a fixed rule.)

The further we go into this matter, the nearer we get to the general subject of standardization, which now stands in such disrepute. It is sometimes argued, and not without apparent reason, that standardization, particularly in the independent telephone field, is something which tends to curtail progress and discourage improvement, and is, therefore, a subject to be avoided. Such a view of this most important subject is just as wrong and harmful as the view which presumes standardization to be a remedy for all evils. If strict economy is to prevail generally, a proper degree of standardization under the proper control, is, I believe, necessary, and I trust that the foregoing remarks have shown, to some extent at least, the necessity for standardization, so far as speech transmission is concerned. This, however, does not conclude the work of standarization, for there is just as much to be done in the way of standardizing engineering practices, operating and construction methods and material.

As a final word, reference is made to the "Standardization Rules" published in Vol. 26, of the "Transaction of the American Institute of Electrical Engineers," as an illustration of what has been accomplished along these lines in the electric light and power field.

TELEPHONE SWITCHBOARD BUILDING IN RECORD-BREAKING TIME.

By S. E. Brown.

Commercially speechless—such was practically the condition in which thousands of business men of Paris found themselves on the morning of September 21st, 1908. Berlin, which the day before was at their elbows, now lay to the northward distant six hundred miles; London, only a moment's time away twelve hours before, was now across the sea; and the provinces of France, which had lain within the shadow of the walls of the capitol, now stretched from Alsace-Lorraine to the Pyrenees.

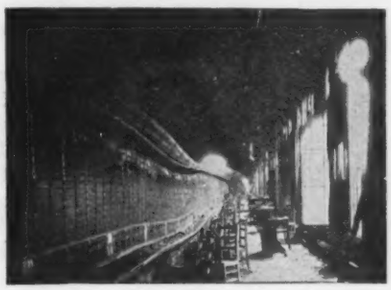


Fig. 1 Paris Main Office, 9,000 Line Board, 3rd Floor, Burned September 20, 1908

The burning of a single building in Paris — the great Central Telephone Exchange — was what isolated and paralyzed her commercially. The fire of a few hours ate up $6,000,000 of property, took the business district out of a single structure and spread it over a wide area and pushed the city back in history more than twenty years.

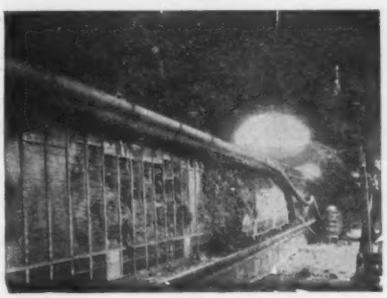


Fig. 2 Paris Main Office, 10,000 Line Board, 4th Floor, Burned September 20, 1908

Rob any city today of its telephone system and it goes back to where it stood before the telephone became a commercial necessity. But what makes the modern city helpless when its telephone equipment is destroyed is that it cannot go back. The reason for this is that the telephone made the modern city possible. Try to imagine New York's skyscraper district without the telephone!

Fig. 3 Paris Main Office, 10,000 Line Board, 4th Floor, Rue Gottenberg Side, Burned Sept. 20, 1908

Business for one day in Paris was carried on by means of what telegraph lines has not been ruined when the telephone building burned, by messenger service, by special conveyance, by each and every method possible that would give a greater speed than mail. The next day saw an emergency telephone equipment caring for crippled business as best it could. Meanwhile hurried conferences were being held by the Paris telephone managers with the Paris representatives of an American manufacturing company relative to an equipment to take the place of that destroyed. For emergency equipments at best are but first aids to the wounded and are to be put aside as speedily as possible.

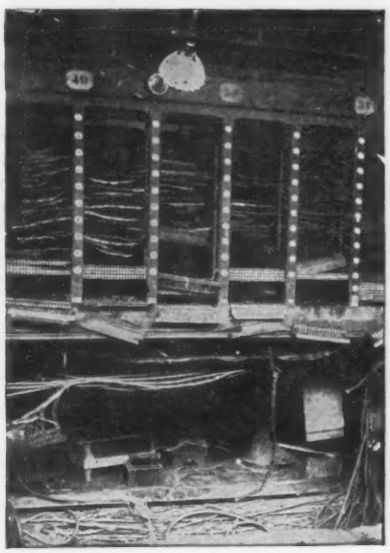


Fig. 4 Paris Main Office, 6,000 Line Board, Burned June 2, 1908

The building of equipment for a telephone exchange the size of the one destroyed requires time, and the people of Paris were clamoring for telephone service. This explains why the managers of the Paris Telephone Company immediately after the fire took their problem up with the largest manufacturers of telephone apparatus in the world. Speed was the controlling factor; speed and quality. So they turned to a company that held the record for both.

The proposition put up to the Paris house of the Western Electric Company was a staggering one, but the Paris house had resources. They themselves had enormous facilities, and back of them was the parent house in New York City, which in turn was backed by the company's Hawthorne plant, just outside the city of Chicago. This last named plant is the largest telephone manufacturing plant in the world, and for it rush orders had no terrors. When fire eliminated the telephone plant in Rio De Janeiro the cable had wildly called for apparatus. Hawthorne met the demand. Then early in the year Tokyo had called on Hawthorne to build material to take the place of a large shipment for Japan which had been lost when the S. S. Holenfels was destroyed by fire. This work was done in less time than Tokyo demanded

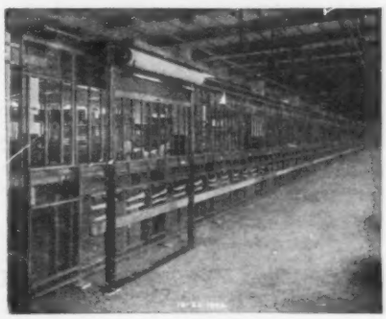


Fig. 5 Framework of the New Western Electric Co., Paris Telephone Switchboard Lined up in Hawthorne Shops Just Prior to Shipment (rear view of board)

Fig. 6 New Western Electric Paris Switchboard Leaving Their Hawthorne Plant in Six Cars

Fig. 7 Front View of Section of Western Electric Paris Telephone Switchboard

So when the request from Paris was telegraphed to Hawthorne, the men in charge of the telephone manufacture figured coolly and swiftly. They knew what they had done before and could be done again. September 22d Paris had the cabled reply that Hawthorne could furnish her part of the equipment complete in less than thirty days.

A diversion was created on the 24th by Paris asking for switchboard cable; a request which terminated a few days later in an order for 135,000 feet; 135,000 feet of cable, by the way, is something more than twenty-five miles of it. The Western Electric Company, however, had the full amount of the size desired in stock at Hawthorne. Hawthorne was ordered to ship. But shipping cable by steamer differs from shipment by rail. The cable must be fully protected from salt water. Nevertheless the twenty-five miles of cable was unwound from reels, the ends paraffined, cable rewound on reels, packed in waterproof cases and placed on cars in less than two days after receiving the order. The men who ran those reels certainly have the necessary speed qualifications.

The most interesting fact brought out by the order, however, was not what the company diu but what it could do. The Paris order for cable, as before stated, was made up from stock. The Hawthorne plant offered to turn out twice that amount weekly from raw material.

Meanwhile the superintendent of the switchboard department at Hawthorne had been having more than a cable order to think about. On September 29th, the New York house telephoned to begin work on a switchboard and cheerily informed him that the Paris house had agreed to have the entire installation completed in sixty days, and that a $600 daily penalty was attached to the contract. The information about the switchboard wasn't quite so indefinite as that, but it was pretty hazy. It was all the information New York could give, however, and all the Paris house could furnish, so the man at Hawthorne went as far as he possibly dared on his meager instructions, meanwhile wondering about the sixty days. He clearly understood about the $600 per day.

October 3rd brought information which was definite. Already a large amount of material had been lined up, and the moment the decisive word from Paris came, men trained to the minute in switchboard building began their tasks. In a trifle over three weeks after a definite order had been given by the managers of the telephone exchange in Paris, the finished switchboard stood at Hawthorne, ready for shipment.

Meanwhile the New York agent had not been idle. The result of his efforts showed that express-train speed in manufacture is only one of many ways of beating penalty time to the tape.

The same day that complete information was given Hawthorne, a request was made for an estimate on the number of carloads and weight of the shipment. Reservation was made on a French line steamer that sailed on October 29th, and arrangements were made with railroads that special attention be given the shipment. It was. The six carloads of material came from Chicago to New York in about two days.

The shipment from Hawthorne, together with a large amount of additional material which the New York house had manufactured, was shipped to Paris on the French line steamer, "La Provence," that sailed from New York on October 29th. Thus only a few days more than a month elapsed from the date the fire occurred in Paris until a completed switchboard from the United States was on the sea; a switchboard, by the way, which stands 180 feet long, requires ninety operators to operate, and will accommodate more than 10,000 subscribers. While the back of this switchboard would appear as unintelligible to the layman as a page of Sanskrit, it may be of interest to know that it contains about a million soldered connections and 3,000 miles of wire. It is of some interest, also, to know that approximately forty thousand feet of lumber were used in packing the completed board, and that 10,000 square feet of paraffine paper was used in the cabling boxes alone.

The replacement was completed November 30th. The $600 daily penalty clause in the contract, for every day over sixty days required in building this switchboard, was thus rendered inoperative.

This is the second record made within a year by the Western Electric Company for rapid telephone exchange replacement; the other being that of the Antwerp exchange — the oldest in Europe —for which a 5,000 line equipment was manufactured and installed in 30 days. The Paris contract covered a 10,000 line equipment and while apparently involving but twice the labor of the other, in reality meant several times more. The fast time made stands as another triumph for American skill and enterprise.

SEASONING AND TREATING TELEPHONE POLE CROSS-ARMS.

There are used every year in the United States about 14,000,000 cross-arms for telephone and telegraph poles. Of these, perhaps one-fourth are now treated with preservatives to increase their durability, and there are at least five plants, at New York City; Norfolk, Va.; New Orleans and Slidell, La.; and West Pascagoula, Miss., at which cross-arms are treated. Because of their small size as compared with the strength required and the weakening effect of the holes for insulator pins, and their constant exposure to all kinds of weather, cross-arms should receive a thorough treatment. A good treatment with creosote will at least treble their durability.

A large portion of the supply of cross-arms comes from the South; they are sawed from the loblolly or old field pine, of which there is a large quantity throughout this region. This tree grows rapidly, but contains much sapwood, which is difficult to season. It has been said that "loblolly pine sapwood will rot before it will season in the warm, damp climate of the South." While this is probably overdrawn, it is necessary so to pile the cross-arms that the air may circulate freely about them, and to protect them from rain and snow by a roof of loose boards. By laying 20 cross-arms in a tier, 2 cross-arms at each side and 2 in the middle set on edge, and allowing a small space between each of the others, which are laid flat, favorable conditions for seasoning are established and no rotting will occur.

Sapwood absorbs preservative so much more readily than heartwood that when both cross-arms in which sapwood abounds and those in which heartwood predominates are treated in the same run, the former absorb an excessive amount before the latter have received what they require. This is not only a needless expense, but a detriment, inasmuch as the excess of creosote in the sapwood later oozes out and drips on those who walk beneath. To solve this difficulty, the cross-arms should be sorted in three classes, as sapwood, intermediate, and heartwood, and treated in different runs.

Cross-arms are treated in large horizontal cylinders varying from 90 to 180 feet in length and from 6 to 7 feet in diameter. Into these the arms are run on skeleton trucks, and the doors are then bolted air-tight. Creosote is next run until the remaining space in the cylinder is filled. Pressure is sometimes then applied by pumps to force the preservative into the wood. In some instances, before the preservative treatment, the cross-arms are treated to a bath of living steam followed by the drawing of a vacuum, to remove moisture and secure rapid penetration of the wood by the preservative. It is the opinion of the Forest Service, however, that the bath in steam is not necessary or desirable if the arms are properly air seasoned. Other recommendations for seasoning and treating cross-arms, and a discussion of the methods now in use, are contained in Circular 151 of the Forest Service, which can be had upon application to the Forester at Washington.

The United States Government has petitioned the Supervisors of San Francisco for permission to lay an underground conduit for a telephone cable connecting Fort Miley with the Presidio. The route of the conduit is to be across Golden Gate Cemetery to Lake street, thence along Lake street to Twenty-second avenue to the northerly end of the avenue.

LAW OF THE TELEPHONE.

By Emerson W. Read.

Telephone and telegraph companies are burdened with the duty of transmitting messages entrusted to them correctly and with reasonable diligence. Cases innumerable have arisen over this particular legal duty of these companies and the law thereon is now generally considered as fully defined and determined. The amount and measure of damage recoverable by persons injured by neglect or failure on the part of these companies to dispatch or deliver these messages has been determined in two cases to which the Western Union Telegraph Company was a party. One, a Texas case (W. U. Tel. Co. v. Cooper), says: "damages may be recovered commensurate with injury, without reference to the degree of negligence causing it, if the inexcusable negligence of a telegraph company's servants is found to be the proximate cause of the injury." The other, an Illinois case (W. U. Tel. Co. v. Dubois), holds that the recovery is "for damages in tort. In such a case, the measure of damage is compensation of his actual loss, following as the natural and proximate consequence of the company's act."

As numerous as the ramifications of modern business are the injuries that persons have suffered by telegraph companies' carelessness in delivering messages to their destinations. Here are a few out of which actual litigation has arisen: "a creditor loses his debt," "non-delivery of a message announcing the death of a person" "definite offer of employment," "message concerning sickness," "buy certain shares of stock," and the like.

What may constitute neglect or carelessness or lack of due diligence, of course, depends upon each individual case. In Western U. Tel. Co. v. Beals, a Nebraska case, the sender of the message delivered to the company's agent a telegram reading, "Attach property of A for seven hundred and ninety dollars." The telegram after transmission was delivered at its destination reading, "Attach property of A for even hundred and ninety dollars." An attachment was placed for $190 and a loss resulted. The company's mistake in transmission was fatal and the company was held liable. In W. U. Tel. Co. v. Flint River Lumber Co., a message was delivered to a telegraph company containing an offer to sell merchandise at a certain price, and the company so transmitted it as to contain an offer at a less price; held, that the sender was bound to furnish the merchandise at the latter price, and he recovered from the company the damage sustained by complying with the offer.

Courts have often taken notice of the difficulty attending the transmission of cipher messages. Numerous cases have arisen out of trifling mistakes on the part of the operators in dispatching a number or letter or language unintelligible except to those having a key to the hidden meanings. In cases where the cipher cannot be intelligibly understood by the operator mistakes are more apt to occur and courts have lessened the burden of the transmitting companies by decreeing nominal damages in many instances where the company's delay or neglect has been largely the result of handling such unintelligible messages. In a Pennsylvania case (Ferguson v. Anglo-American Tel. Co., 178 Penn. St., 877), the message read, "Bewail boarish, bewail bluster, provided steamer Kingsdale," and as a result of some delay on the telegraph company's part the message failed to reach its destination in time to be of use and of effect. Quoting from another decision the court said, ". . . . here is a question of public policy to which we could not shut our eyes if we were in doubt upon the question. Where a cipher dispatch is delivered to a telegraph company for transmission, and not translated to them, and there is a delay in delivering it or a total failure to deliver it, the door is open to unlimited fraud upon the company. The evidence of its meaning is entirely in the breast of the sender and person to whom it is sent. They may construct any meaning they choose, and, upon the meaning thus constructed, they may, by evidence which the company may be powerless to rebut, construct any fabric of facts on which to build an action for damages which they may see fit."

In another particular have cipher messages a significance that courts have noted. Operators, except from direct instructions or the context of the message, cannot tell what messages are urgent or subject to "rush." Many telegraphic messages have no commercial or financial significance. Messages of urgency are "rushed" if the need thereof comes to the knowledge of the company's operators. As has been said very often the operator learns of this need by reading the message and gaining some knowledge as to the purpose of the telegram. Ordinarily, cipher messages are unintelligible to operators and very few messages so written will inform the agents of transmission that their purpose requires haste and diligence in delivery, if they are to be of effect. Times innumerable courts have decided that only nominal damages will be awarded by the court for damages resulting from the company's delay or mistake in delivery. An instance arose where the word "urgent" appeared on the face of a telegram written in cipher. On translation it appeared that the word's only purpose in the telegram could have been for the operator's instruction. However, as its purpose could not be known by the operator the company was not held liable for damages that would not have resulted had the message been "rushed."

From what has already been said it is evident that the purpose of the telegram, the object of the sender in sending it, has considerable bearing upon the duties and liabilities of the company employed to transmit it. "When a telegraph company is given notice of the main purpose for which a telegram is sent, it is chargeable with notice of whatever the dispatch suggests, and for every incidental fact attending the transaction which it could have ascertained by the most minute inquiry." (W. U. Tel. Co. v. Edsall, 15 Am. St. Rep. 835). Once this purpose is known the company is chargeable with extreme care that the message reaches its destination in time and in condition to serve the purposes intended, provided, however, that the company cannot be required to adopt other than reasonable measures to obtain its delivery. In other words, carriage by telephone and telegraph differs in its duties and obligations from other public service corporations only insofar as the differences exist in the various businesses of such companies. Although great care or, even, extraordinary care and diligence are required in many instances, yet, such degrees of care or diligence are imposed when deemed by the courts reasonable in the premises.

EXAMINATION FOR HULL DRAFTSMAN.

The United States Civil Service Commission announces an examination, on January 6-7, 1909, to secure eligibles from which to make certification to fill two vacancies in the position of hull draftsman, one at $100, and the other $125 a month, in the Light-House Board, Department of Commerce and Labor, and vacancies requiring similar qualifications as they may occur in any branch of the service. The employment of these draftsmen and others engaged upon marine construction work is dependent upon the amount of such work authorized by Congress, and therefore it is impracticable to state definitely how long their services will be required. The preparation of plans and specifications for vessels heretofore authorized will require their services for some months.

EXAMINATION FOR DRAFTSMAN.

The United States Civil Service Commission announces an examination, on January 6-7-8, 1909, to secure eligibles from which to make certification to fill a vacancy in the position of marine engine draftsman in the Light-House Board, Department of Commerce and Labor, at $137.50 a month, and vacancies requiring similar qualifications as they may occur in any branch of the service. The employment of this draftsman and of other persons engaged upon marine construction work is dependent upon the amount of such work authorized by Congress, and it is therefore impracticable to state definitely how long the services will be required. The preparation of plans and specifications for vessels heretofore authorized will require service for some months.

THE TELEPHONE BOOK OF TO-MORROW.

The telephone directory in any community is now so important as a list of business houses and prominent residents, says James H. Collins in "Printer's Ink," that for many purposes it has supplanted the city directory. It might surprise you yourself, for instance, to try and remember how long ago you last looked into the city directory to find an address. Ten years ago you looked nowhere else. But to-day the telephone book is your directory for ordinary purposes, and chances are that anybody who isn't in it is nobody. Even with an address taken from the city directory there is the mistrust that the person may have moved since the book was published.

Where do we usually see the telephone book?

Isn't it usually within a foot of a telephone? Isn't it often nailed there, in fact? Children may use the big family Bible to press botanical specimens. The encyclopedia gathers dust, and nobody remembers who had the dictionary last. But the telephone and the telephone book are inseparable, and if anybody takes one away from the other a mighty howl goes up to high heaven.

These two modern conveniences are kept together because one must be used with the other. Upon that bond the telephone men will some day build a new advertising medium of the utmost importance to every sort of business that turns on local transactions. Even now this reference work is a fair sort of advertising medium. The advertising manager of the telephone company usually sells its back, edges and cover pages to advertisers, and in many cities and towns there is an advertising section at the end, or advertisements scattered through the pages. But it is fairly safe to say that not even the most enterprising telephone man has yet realized the possibilities waiting development in this field.

Every telephone directory, for instance, ought to have a theatrical department.

What happens when you want to go to the theater some evening, say in New York? The idea comes up perhaps at dinner. A daily paper is consulted. Theater cards in daily papers are intensely utilitarian. Sometimes not even the street address is given. There are several shows that one would like to see, but usually they are the big successes, and it is uncertain whether seats can be bought on such short notice. Or the mood at the moment may be for music. There is a concert at Mendelssohn Hall. Where is this hall? The ad gives no street or number, and these may not be found in street guides. The Broadway success that ran two years in the Tenderloin, and for which it was impossible to get seats at that time, may now be running at one of the secondary theaters with plenty of room for late-comers. But the secondary theater says nothing about this in its newspaper card.

When the telephone book contains a theatrical advertising section it will be sufficient to turn to the daily paper to find out what shows are on that evening. Then turn to the telephone book and find out how to secure seats.

The first telephone company to establish such a theatrical advertising section in its directory will probably lay down a foundation in advance by several months of educational advertising. A prominent page in the book itself will be given up to a talk on the convenience of securing theater and concert seats by 'phone. Newspaper space may be taken to make the idea plain, and when the public has caught it then the theaters will be canvassed. Theater managers may fail to see the real point at first.

"Advertise in the telephone book!" they will say. "Why, it comes out only twice a year. We cannot announce our shows."

But the daily paper already announces the shows. The telephone book is to be a *selling* medium. Here it will be possible to outline facilities for supplying seats by wire, and to state how payment can be made, and how long seats will be held. Minor theaters will tell something of the character of their attractions, and make it plain that many of the crowded Broadway successes of yesterday can now be seen at convenience, in comfort and for popular prices.

Steamship companies, railroads, employment bureaus, etc., will have advertising sections in the telephone book on the same principle, telling how information may be instantly obtained regarding sailings, trains, etc., and berths and tickets reserved. Cab and transfer companies will be classified. People now use the 'phone freely to call cabs and send baggage. But there are always hundreds of strangers in town who do not know even the names of these companies. Daily newspaper space costs too much to be used in reaching this clientele. Telephone book advertising will be reasonable in cost, and once the idea of such an advertising medium spreads over the country it will be the ready resource of travelers.

The prime advertising value of the telephone book, of course, is that it is always near the telephone in the home, the office, the hotel, the corner drug store. Side by side with the means of advertising is the means of making the sale. The telephone companies have done much educational work in teaching people how to use the instrument. Much of it, however, has been advertising of gratuitous service, such as telling the correct time, calling subscribers at a stated hour, the furnishing of election and sporting returns, etc. But all this educational work based on the directory ads will be productive of direct revenue for the companies.

Another advertising section of undoubted value will be that devoted to shopping by telephone. The big stores spend money to educate the public to shop by mail, and hardly anything to inculcate the idea of ordering by 'phone. The pressure upon big stores in the afternoon is often a serious problem, which many of them attempt to meet by giving exceptional bargains or premiums in the morning. All mail business relieves this pressure. The telephone can be requisitioned to relieve it further. Every retail business now has excellent telephone facilities for handling orders—facilities usually far better than the business that comes through this channel. When the telephone companies take up the work of educating people to shop by mail, and establish classified shopping guides in the directories where merchants may explain their 'phone facilities, it will mean a growth of very desirable business for the stores and also of remunerative telephonic traffic. The cost of shopping by telephone is one-half the cost of car fare in a city, or railroad fare from out of town, with all the expenditure of time and nervous energy left out. This can be made a service of importance, not only to the big stores, but also to many of the smaller merchants who cannot afford to use daily papers liberally. In the telephone book it will be possible to describe the general scope of a store's stock, and to publish a list of standing leaders, with prices.

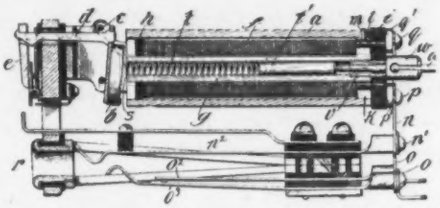
It is not at all radical to predict that the telephone book of the future will have a "Household" classification, containing the cards of every business house likely to be needed in the routine of a home. When people want the plumber, they want him in a hurry. So with the furnace man, the jobbing carpenter, the wiring contractor, etc. Druggists making a specialty of prescription and emergency service will be classified. Physicians and hospitals can advertise in a classified telephone directory by the simple cards that are unobjectionable from the ethical standpoint. Every sort of business and professional service, especially of an emergency character, can use the telephone directory when the telephone company does its part in establishing the necessary classifications and educating the public to use them.

But people must be taught to use the directory. Thus far, the advertising published in these books has lacked the arrangement that will be necessary when more such business is secured. There is only one front cover page, for example. It makes an excellent place for just one cab company to make its announcement—and at the same time acts as a check on other companies who do not wish to be buried in the body of the book. At least half a page is needed under present conditions. With proper classification, an inch or two would often be sufficient, and instead of one cab concern there would be all of them, together with livery stables, motor garages, etc.

PATENTS

TELEPHONE-EXCHANGE APPARATUS. 905,619. Ernest E. Yaxley, Chicago, Ill., assignor to Monarch Telephone Manufacturing Co., Chicago, Ill.

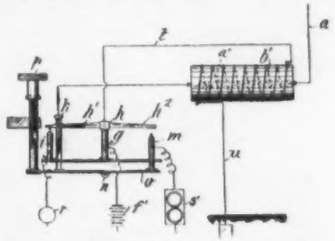
An annunciator having an electro-magnet including a shell portion, the spool portion containable within the shell portion, a locking device having one locking member provided upon the shell portion and a companion locking mem-



ber provided upon the spool portion, said members being adapted for locking connection by rotation of the spool with respect to the shell, and a fastening device for preventing the rotation of the spool with respect to the shell when the members of said locking device are engaged.

RECEIVER ARRANGEMENT FOR WIRELESS TELEGRAPHY. 905,537. Gerhard Jahr, Berlin, Germany.

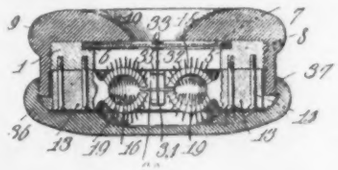
Receiving means for wireless telegraphy comprising in combination a coil of wire, a receiving device, terminals therefor, an antenna passing through said coil, connected with one



terminal of said receiving device, a conductor connecting that end of said coil at which said antenna enters into the same with the other terminal of said receiving device and a conductor connecting the other end of said coil to earth.

TELEPHONE-RECEIVER. 905,781. Nathaniel Baldwin, Heber, Utah, assignor of one-half to William Witt, Heber, Utah.

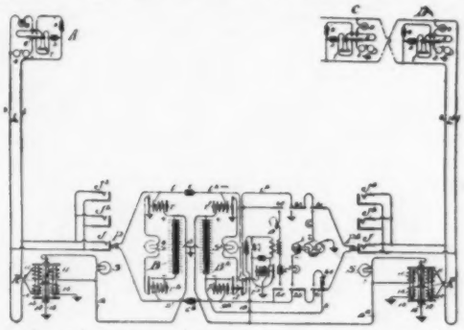
In a magneto telephone, a permanent magnet formed of two parts having like polar ends adjacent one to another, soft iron pole pieces confined between said adjacent ends of the magnets and extending one toward the other, said pole pieces



each terminating in opposing legs or extensions having their ends in proximity, an armature between the proximate faces of the legs or extensions of the pole pieces, and coils upon said legs or extensions connected for producing opposite effects upon the legs of the same pole pieces.

TELEPHONE SYSTEM. 904,850. Francis W. Dunbar, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill.

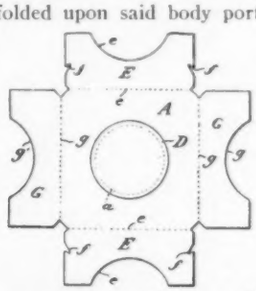
In a telephone system, the combination with a telephone line, of a polarized line-signalling device connected therewith at the central office, a source of current connected with the line at the central office and adapted to send current through said device in the proper direction to operate the same when the subscriber is calling, a cord circuit at the central office to establish connections with the line for conversation, a pair of electro-magnets, one associated with each limb of the cord circuit, a supervisory signal controlled by said magnets, one of said magnets being included in a local circuit with the actuating



windings of said device when a connection is established with the line, the current in said local circuit being in the proper direction to render said device inoperative and sufficient to energize the magnet to cause said supervisory signal to operate, and the other magnet being placed under the control of the subscriber and serving, when energized, to render the supervisory signal inoperative.

SHIELD FOR MOUTHPIECES OF TELEPHONES. 905,330. Thurston M. La Jord, New York, N. Y., assignor to Schuyler S. Hampton, New York, N. Y.

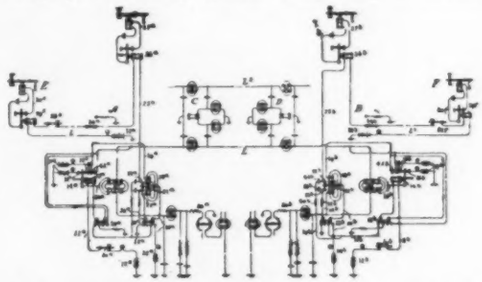
A shield for telephone mouth-pieces comprising a body portion, members folded upon said body portion, said members



being adapted for engagement with a mouth-piece, and means elastically connecting said members, said means being independent of the mouth-piece to which the shield is adapted to be applied.

TELEGRAPHIC REPEATING APPARATUS. 905,628. William E. Athearn, New York, N. Y., assignor to American Telephone and Telegraph Company, a corporation, of New York.

A telegraph repeating system comprising a circuit having



at each of two stations a current-reversing transmitter and a polarized relay, and a single-transmission circuit arranged to control the transmitter at one station and being itself directly controlled by the relay at the same station.

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday for the paper dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Mathematics in Telephony

The task of the pioneers in the field of telephony, those who laid the foundations for the great telephone systems of today, was entirely different from that of the present workers. The former sought out and established the principles of the most cardinal importance only; and, as history teaches, more brains are required for this than is generally supposed. When the most important facts are once furnished, we are then in a position to work out the principles deductively and logically and to formulate general rules.

Destined to a high place in this latter group is the valuable paper read at the recent telephone convention at Chicago by MR. FRANK E. FOWLE on the "Economical Development of Toll Territory." The full import of this paper could hardly be grasped by those present at the convention, because of the limited time for consideration. But with time this paper will be regarded as one of the classics in the history of telephony. The author finds that

> "the public demand for toll service occurs in such ways that certain laws may be formulated which will express mathematically or graphically the volume of message traffic which will occur on the average under any given or known set of conditions. The design of a toll system divides itself naturally therefore into two parts: first, the predetermination of the traffic, and second, the layout of a plant which will provide the necessary facilities in the most economical manner."

As the result of a close study of the traffic between a large number of cities and towns under a fixed rate schedule, Mr. Fowle finds that the traffic volume and messages per month in both directions between any pair of zones is represented by the formula:

$$T = .00022 \quad \frac{P_1 P_2}{D_2}$$

where T=the total message per month in both directions, P_1=population of either zone, P_2=population of the other zone, D = distance between the zone centers, in miles.

This formula is found to be sufficiently accurate for development study. Other formulae were shown for determination of toll rates and revenue per message, together with a large number of long-distance telephone plant curves.

These mathematical deductions are valuable in that they give a shorthand notation for many involved problems and cannot fail to be of assistance to the designing and constructing engineers.

National Regulation of Telephone Companies

In his last annual message to Congress, President Roosevelt states that

> "Telegraph and telephone companies engaged in interstate business should be under the jurisdiction of the Interstate Commerce Commission."

This is a part of his general recommendation that all great corporations engaged in interstate business

should be removed from the domain of the inoperative Sherman anti-trust law.

> "The power of the commission should be made thorough-going, so that it could exercise complete supervision and control over the issue of securities, as well as the raising and lowering of rates. As regards rates, this should be made summary."

In accordance with a decision of the United States Supreme Court, a State cannot regulate the rates charged by telephone companies in interstate business, and the right to regulate charges within many States is also questioned. There is not only this question of authority, but also the likelihood of conflict that is inevitable when neighboring States make differing rates. As national regulation cannot but foster a spirit of confidence among investors and a feeling of friendship among users, legislation in this direction will be welcomed by the majority of broad-minded telephone men.

TELEPHONE CONVENTION.

The twelfth annual convention of the International Independent Telephone Association was held at the Auditorium Hotel, in Chicago, on December 1, 2 and 3, 1908. P. C. Holdoegel, of Iowa, presided. Judging from the large number of delegates present and from the high standard of the technical and practical papers presented, this convention was an unqualified success and one that has done much to create a strong spirit of co-operation among the Independent telephone men.

The business sessions were occupied with reports as to telephone progress in the different States represented, including Illinois, Nebraska, Indiana, Iowa, Michigan, Missouri, Ohio, Texas, Kansas, West Virginia, Wisconsin, Arkansas, California, Kentucky, Maine, Minnesota, North Carolina, Oregon, Tennessee, Virginia, and Washington, as well as Canada. A number of minor amendments were made in the constitution, and reports received from the Advisory Committee and the Committee on Litigation. A fund of $15,000 was raised by the Finance Committee for the expense of protecting the Independent telephone interests during the coming year.

Technical and practical papers were presented during the session by the following members:

J. G. Ainsworth, general manager of the Home Telephone Company, of Dayton, Ohio, "Some Economies in Handling Maintenance Men."

J. C. Bickley, of Waterloo, Iowa, "Maintenance Economies."

P. J. Boylan, of the Home Telephone Co., Detroit, Mich., "Handling Trouble,"

F. E. Fowle, on the "Economical Development of Toll."

Geo. E. Gann, of Lincoln, Neb., on "Handling Long Distance Traffic."

W. T. Sherfesse, of the United States Forest Service, on "Pole Supply and Preservation."

George H. Raymond, treasurer of the Consolidated Telephone Companies of Buffalo, N. Y., "Financial Problems."

W. S. Hart, attorney-at-law of Waukon, Iowa, "The Cost and Prevention of Damage Suits."

J. P. Hoge, of Cleveland, Ohio, "Insurance, Liability and Fire."

C. E. Wilson, of Philadelphia, Pa., "Pernicious Political Pull."

E. B. Fisher, "Sound Financial Policy."

Gerald Deakin, assistant engineer of the Home Telephone Company of San Francisco, "Practical Telephone Units and Standards."

Professor Morgan Brooks, of Illinois State University, "Some Telephone Problems."

Several of these papers elicited considerable discussion and a number of them will appear in future issues of the JOURNAL OF ELECTRICITY, POWER AND GAS.

An enjoyable banquet was held on Wednesday evening, at which clever speeches were made by W. S. Hart on "The Crowning Triumph"; D. J. Cable, of Lima, Ohio, on "Mergers and Alliances"; Judge Showalter, of Parkersburg, West Virginia, on "Competition vs. Monopoly"; Clarence Browne, of Toledo, Ohio, on "Telephones and the Law"; Manford Savage, of Champaign, Ill., on "Our Emblem."

The following officers were elected for the ensuing year: E. H. Moulton, president; P. C. Holdoegel, first vice-president; E. B. Fisher, second vice-president; J. F. Demers, third vice-president; W. J. Uhl, fourth vice-president; Manford Savage, treasurer; A. C. Davis, secretary; executive committee to serve one year—A. E. Boqua, Arkansas; J. W. Barnes, West Virginia; M. L. Gollady, Missouri; I. H. Griswold, New York; A. E. Yaxley, Illinois; to serve two years — F. D. Houck, Pennsylvania; Frank G. Hoge, Kentucky; W. H. Nelson, Kansas; J. F. Demers, Canada; H. D. Critchfield, Wisconsin; to serve three years—Frank H. Beam, Ohio; Manford Savage, Illinois; J. H. Shoemaker, Iowa; C. S. Norton, Indiana; E. B. Fisher, Michigan.

At a meeting of the Advisory Board held Friday morning the following Executive Committee was elected: E. B. Fisher, Grand Rapids, Michigan; Jas. S. Brailey, Jr., Toledo, Ohio; C. Y. McVey, Cleveland, Ohio; F. D. Houck, Harrisburg, Pa.; P. C. Holdoegel, Rockwell City, Iowa; Wm. H. Bassett, St. Louis, Mo., which, with the president, makes the committee of seven.

The exhibitors at the convention were the American Electric Telephone Company; Automatic Electric Company, Chicago; Century Telephone Construction Company, Buffalo, N. Y.; Chicago Telephone Supply Company, Elkhart, Ind.; Cracraft-Leich Electric Company, Genoa, Ill.; H. E. Cobb, Chicago; Frank B. Cook, Chicago; Corwin Telephone Manufacturing Company, Chicago; W. H. Couch, Boston, Mass.; Dean Electric Company, Elyria, Ohio; Duplex Metals Company, New York City; Electric Appliance Company, Chicago; Excelsior Supply Company, Chicago; Fibre Conduit Company, New York City; Fox & Borden Manufacturing Company, New York City; H. S. Green Battery Company; Holtzer-Cabot Electric Company, Brookline, Mass.; Illinois Electric Company, Chicago; Indiana Steel and Wire Company, Muncie, Ind.; Manhattan Electrical Supply Company, Chicago; Miller Anchor Company, Norfolk, Ohio; Monarch Telephone Manufacturing Company, Chicago, Ill.; National Carbon Company, Cleveland, Ohio; North Electric Company, Cleveland, Ohio; Ohio Brass Company, Mansfield, Ohio; F. W. Pardee, Chicago; Pierce Specialty Company, Elkhart, Ind.; Homer Roberts Telephone Company, Chicago; St. Louis Malleable Casting Company, St. Louis, Mo.; Sterling Electric Company, Lafayette, Ind.; Stromberg-Carlson Manufacturing Company, Rochester, N. Y.; Swedish-American Company, Chicago; Telephony, Chicago; Vote-Berger Company, La Crosse, Wis.; Warner Electric Company, Muncie, Ind.; Westinghouse Machine Company, East Pittsburg, Pa.

PERSONALS

Ralph L. Phelps, Pacific Coast manager of the Safety Insulated Wire & Cable Co., is making a short trip to Los Angeles.

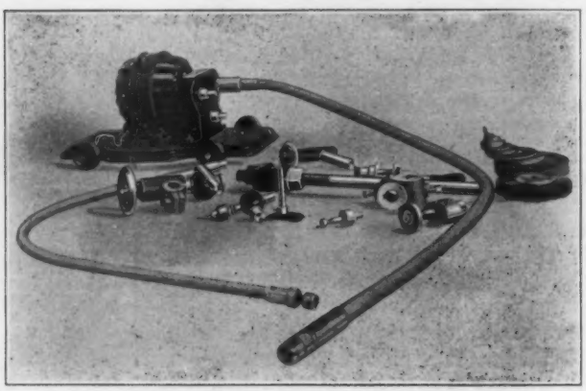
G. A. Knoche, manager of the electrical department of Dunham, Carrigan & Hayden Company, San Francisco, is in the East on business connected with his company.

F. F. Skeel, who has been in San Francisco for the past two weeks in the interest of the Crouse-Hinds Company, Syracuse, New York, left on Thursday for the South. He will spend two or three days in Los Angeles, then return to his home in Chicago where he will spend the holidays.

INDUSTRIAL

SMALL MOTOR-DRIVEN EMERY WHEELS, BUFFERS, AND DRILLS.

The illustration shows a handy motor-driven, flexible-shaft outfit furnished the United States Government by the Coates Clipper Manufacturing Company, of Worcester, Mass. The equipment consists of a breast drill, drill press, emery wheels and polishers, and is provided with such necessary attachments as a multiplier, clamp, spindle, old-man, etc. The motor is a 1-horsepower Westinghouse type CCL alternating-current motor mounted on a portable truck, and fitted with speed-changing head and flexible shaft. The portability makes the appliance convenient for any large work, and the flexible shaft permits the operator to work with ease upon otherwise difficultly accessible parts.



In order to obtain the proper cutting speeds for emery wheels of different diameters, multipliers of the proper ratios are used. The two which can be used to best advantage are those having ratios of 8½ to 1 and 6½ to 1 respectively; the former for use with ⅜-inch, ½-inch, and 1-inch wheels, and the latter for 2-inch and 3-inch wheels. Larger sizes are used on a clamp spindle, which runs at the speed of the shaft, 1,800 to 2,500 revolutions per minute.

By removing the breast plate on the drill and attaching a combination old-man, drilling up to ½ inch can be readily done. Larger drills up to 1¼ inches are used in connection with a worm-feed drill press and old-man attachment.

The outfit is so arranged that a heavy or light shaft can be used according to the requirements of the work. The smaller shaft is fitted with a taper end sleeve for taking small tools, and the larger shaft with clutch sleeve and grab dog clutches, so that one tool can be used after another without making any change in the shaft.

WESTINGHOUSE DIRECTORS.

At the meeting of the Westinghouse Electric & Manufacturing Company, held at East Pittsburg, Nov. 30, 1908, final action was taken by the stockholders prior to the termination of the receivership. While the attendance of individual stockholders was no larger than at last week's meetings, the proxy representation was much larger. E. M. Herr, vice-president of the company, acted as chairman, and Chas. A. Terry, as secretary.

The object of the meeting was to pass resolutions amending the by-laws so as to allow of the election of sixteen directors, to classify the directors into one, two, three, and four-year terms, and to provide for the election of a proxy committee. These resolutions being unanimously passed, the following board of directors was submitted to the stockholders, and which was elected as follows for their respective terms:

For the class whose term expires on the third Wednesday of July, 1909—Richard Delafield, E. C. Converse, Anthony N. Brady, J. D. Callery.

For the class whose term expires on the third Wednesday of July, 1910—A. G. Becker, Geo. M. Verity, William McConway, Charles A. Moore.

For the class whose term expires on the third Wednesday of July, 1911—Charles F. Brooker, James S. Kuhn, Edward F. Atkins, E. M. Herr.

For the class whose term expires on the third Wednesday of July, 1912—George Westinghouse, Neal Rantoul, Joseph W. Marsh, Albert H. Wiggin.

The last action of the meeting was the election of a proxy committee, which resulted as follows:

James N. Jarvie, Jacob H. Schiff, Charles Francis Adams, Robert S. Smith, F. W. Roebling.

A NEW LAMP TESTING WATTMETER.

A practical demonstration of the high efficiency of the new metallic filament incandescent lamps will often aid in their introduction, particularly with prospective customers to whom seeing is believing. All that is necessary to make such a test is a simple indicator that will show the relative watt consumption of metallic and carbon filament lamps, and for this purpose the "Lamp Testing Watt Indicator" has been designed by the General Electric Company. This instrument should prove especially valuable in introducing the new 25-watt tungsten lamp. One comparison of this lamp with the ordinary carbon filament lamp should prove a more convincing argument than an hour's talk on their relative merits.

This watt indicator is constructed on the Thompson inclined coil principle, and has a scale marked directly in watts, at different voltage values. The moving element is mounted in jewelled bearings. The case consists of a single aluminum alloy casting, on each side of which is a brass dome. At the top there is an Edison screw plug, and at the bottom a lamp receptacle.

Although the lamp testing wattmeter is intended for use with Edison sockets and lamps equipped with the Edison base, an adapter can be supplied permitting its use with either the Thompson-Houston or Westinghouse socket or lamp base.

To use the instrument, the plug is screwed into a lamp socket and the lamp to be tested is inserted in the receptacle at the bottom of the instrument. The pointer will then indicate the watts consumed by the lamp. The plug end of the instrument is equipped with a spring contact end, permitting an extra turn so that the scale may always be in full view.

The instrument is provided with a multiple scale, permitting direct readings when used on 100, 105, 110, 115 and 120 volts. For intermediate voltages, reading may be interpolated. The capacity of the winding is 1½ amperes, and the maximum scale marking is 125 watts. The size of the instrument is such that it can be conveniently carried in the pocket.

TRADE CATALOGUES.

Electric Goods Manufacturing Company, of Boston, Mass., have issued a telephone section of their nineteenth edition catalogue. It illustrates and describes telephone apparatus for a large variety of uses, being especially arranged to help the architect and contractor in specifying and ordering. Much valuable information, including several wiring diagrams, is contained in this catalogue.

NEWS NOTES

TELEPHONE.

BELLINGHAM, WASH.—By the installation of six additional toll circuits between this city and Seattle, the Pacific Telephone & Telegraph Company is preparing to inaugurate a "rapid-fire" long-distance service.

FERNIE, B. C.—Morris Quain, superintendent of the East Kootenai Telephone Company, has put a force to work on the reconstruction of the Fernie telephone plant. This company has planned extensive development in the Northwest during the coming year.

HELENA, MONT.—The Automatic Telephone Company has broken ground for its underground conduits. The company will also erect a fine building here.

LAMONT, WASH.—A crew of men has commenced work on the local telephone exchange. A line will be constructed to connect with the Pacific States Company at Sprague.

MARSHFIELD, ORE.—The Coos Bay Home Telephone Company, which recently bought from the Pacific States Telephone & Telegraph Company the Coos Bay and connecting lines, has just closed a contract for the installation of new equipment, at a cost of $35,000.

PORT ORCHARD, WASH.—The Island Empire Telephone & Telegraph Company has been granted a franchise.

PRINCE RUPERT, B. C.—The Grand Trunk Pacific Railway will install and operate a telephone exchange here.

TACOMA, WASH.—Recommendations will be made by C. W. Burkett, chief engineer, and D. S. Murray, superintendent of plants of the Pacific Telephone & Telegraph Company, to the Board of Directors, that $175,000 be expended for improvements in Tacoma next year.

OAKLAND, CAL.—The Home Telephone Company has renewed its application before the Supervisors, to obtain a franchise to extend its system into the country districts, G. B. Ocheltree, secretary of the company, filing a petition signed by several hundred residents of Fruitvale and Melrose, asking that the petition be granted. The Supervisors, as they have done with previous petitions, referred the matter to a committee of the whole. At a recent executive session the Supervisors decided they would not grant the franchise unless the Home Company paid a reasonable price for it. The company has offered $2,500, and the Supervisors demand $25,000. The company has asked that the franchise be sold to the highest bidder, but the Supervisors decline to follow this suggestion.

BERKELEY, CAL.—Installation of the phones of the Home Telephone Company is progressing rapidly, and the company has practically completed the work in South Berkeley. Many business houses along Alcatraz Avenue and for some distance north on Adeline, from the southern boundary of the town line, are using the new service, and the company is prepared to begin work nearer the central portion of the town. The wires along Shattuck Avenue have been placed, and the work on the company's home office and building, at the corner of Milvia and Allston Way, is progressing rapidly. The building, which is a handsome two-story brick and stone structure, should be completed by the time the wires are all installed. The brick walls are finished, and the work on the interior is all that yet remains to be done.

SANTA BARBARA, CAL.—The Home Telephone Co., of Santa Barbara, has recently purchased a new switchboard for its Santa Maria exchange.

WILLOWS, CAL.—The Glenn County Telephone Co., of Willows, Cal., has commenced work on its system to cover the entire Glenn County, and has its telephones and switchboards ordered for its complete plant. This company is meeting with success in disposing of its securities.

MARSHFIELD, ORE.—The Coos Bay Home Telephone Co., of Marshfield, Ore., will expend some $50,000 improving its system, and is putting in a complete new plant at North Bend and Marshfield. It has ordered a new switchboard and complete telephones from the Dean Electric Co., and expects to have same in operation by the latter part of February.

PORTLAND, ORE.—The Home Telephone Co., of Portland, Ore., has purchased a new switchboard for its Corvallis plant, from the Stromberg-Carlson Co. This plant will be changed to full four-party harmonic.

SILVERTON, ORE.—The Interurban Telepohne Co., of Silverton, Ore., has purchased a complete new board for its plant at Silverton.

EVERETT, WASH.—The Farmers' Mut. Ind. Tel. Co., of Everett, Wash., on account of the rapid growth in Anacortes, has ordered a complete new harmonic common battery multiple switchboard. This plant will be equipped to give the finest telephone service on the Pacific Coast.

BREMERTON, WASH.—The Kitsap County Telephone Co., of Bremerton, Wash., has arranged for the placing of its securities, and has placed orders for switchboards in its Bremerton, Port Orchard, and Port Blakely exchanges. These boards will be of the full common battery multiple harmonic type, manufactured by the Dean Electric Co., of Elyria, Ohio.

PORTLAND, ORE.—The East Portland exchange of the Pacific T. & T. Co. has been converted from local-battery to common-battery. This is the last of the Portland exchanges to be transferred. The entire city is now working under common-battery. The long-distance lines between Portland and Seattle have been reconstructed so as to cross the Columbia River at Kalama instead of Vancouver, as heretofore. This will eliminate one submarine crossing, as the new lines will not cross the Willamette River.

ASTORIA, ORE.—The new central office bulding of the Pacific T. & T. Co., at Astoria, has been completed, and installation of the central office equipment begun. It is expected that the new board will be in use shortly after the first of the year. The new building has been constructed by the company on its own property, and the completed installation will give Astoria one of the most modern and up-to-date exchanges on the Coast.

PLACERVILLE, CAL.—People here are organizing, under the name of the Placerville-Lotus Telephone Company, to build telephone lines between Granite Hill, Coloma, and Lotus.

HONOLULU, H. T.—The Island Wireless Telegraph Company has changed its name to the Hawaiian Telegraph & Telephone Company, will increase its capital from $150,000 to $1,000,000, and will build telephone systems in Honolulu and elsewhere, to be operated in connection with its wireless system. Clinton J. Hutchings, formerly of San Francisco, who is at the head of the company, has arranged for the purchase of a lot, on which it is proposed to erect a $50,000 building for the company. The company has contracted with the Automatic Electric Company, of Chicago, for automatic phones.

WASHINGTON, D. C.—The Supreme Court of the United States has decided that the city of Los Angeles had a right to pass an ordinance regulating the charges to be made by the Home Telephone Company, and requiring the company to make annual statements.

SAN FRANCISCO, CAL.—The Standard Oil Company, through J. C. Rohlfs, manager of the marine department at this port, has arranged to equip the company's Pacific Coast steamers, Atlas, Asuncion, and Maverick, as well as the company's Barge 91, with wireless telegraph apparatus. The system of the United Wireless Telegraph Company will be used.

FINANCIAL.

SAN DIEGO, CAL.—The San Diego Electric Railway Company has taken steps to create a bonded indebtedness of $5,000,000 for the purpose of discharging a previous indebtedness, and to make extensions and betterments.

SIERRA MADRE, CAL.—A movement is under way here to have an election called for the purpose of voting bonds to the amount of $30,000 for the erection of a municipal gas plant.

BISBEE, ARIZ.—The sale of the $250,000 in water bonds recently voted, which was to have been made at the last meeting of the Board, has been postponed till December 12th.

BAKERSFIELD, CAL.—Judge Mahon, of this city, has rendered a decision in the case of the McKittrick Oil Company against the Pittsburg Oil Company, concerning the land under dispute. He permits both parties to pump all the oil they desire from the wells on the land in dispute, but allows neither to sell or remove the oil until a final decision as to the ownership of the land in dispute is reached.

NAPA, CAL.—According to a report just issued by General Manager L. J. Perry, of the San Francisco, Vallejo & Napa Valley Electric Road, the road carried over 500,000 passengers during the year ending June 30, 1908. Of these only 63,000 passengers were between Napa and St. Helena.

SAN FRANCISCO, CAL.—The Spring Valley Water Company has filed a demurrer in the suit recently instituted by some 3,405 claimants who asked for damages running well into the millions against the company for losses incurred in the great fire. The demurrer was followed by a motion to dismiss the suit on the ground that the court is without jurisdiction.

SAN FRANCISCO, CAL.—The local land office has received notice that a former decision of the department in the case of the McKittrick Oil Company against the Southern Pacific Railroad Company in favor of the latter, has been reversed on appeal. The interior department now holds that the land was not patented by the Southern Pacific Company, as was at first held.

ANTIOCH, CAL.—The Antioch Oil Company has levied an assessment of one and one-half cents per share on the stock of the company, delinquent December 24th.

BAKERSFIELD, CAL.—The Grand Prize Oil Company has levied an assessment of one cent per share on the capital stock of the company, delinquent January 11th.

SPOKANE, WASH.—Stockholders of the Washington Water Power Company authorized the directors, at a meeting in Spokane, December 1st, to issue $15,000,000 in bonds, and accepted the proposition of Lee, Higginson & Co., of Boston and New York, and Moffat & White, of New York, to take over the entire issue. The price was not given out. Six million dollars' worth of the issue will be placed on the market in 1909, when, also, $1,000,000 in new stock will be issued. The latter issue will be made January 1st. The company plans to expend $7,000,000 in the betterment and extension of its railway, power and light systems in and near Spokane. This includes a plant now under construction at Little Falls, on the Spokane River, the extension of the underground wires in Spokane, with a view to ultimately doing away with poles in the streets, and the erection of a building on Post Street and the Spokane River, on the site of the old C. & C. mill, which is now used as a passenger station for the Medical Lake and Cheney line. The building will be 100x200 feet, and will be designed as a power station to be used as a distributing point for various parts of the city, and for transforming the power from alternate current to direct current for the city street car lines and the lighting system. Part of the building will be temporarily partitioned off and used for a passenger station until an adequate passenger station can be built. D. L. Huntington, vice-president and general manager says it is likely the building will be three stories high.

INCORPORATIONS.

LOS ANGELES, CAL.—The Yucaipa Valley Water & Improvement Company has been incorporated here, with a capital stock of $100,000, by G. W. Hopkins, W. M. Campbell, P. S. Rishel, H. L. Mueser, and G. D. Brady.

LOS ANGELES, CAL.—The Belle Vernon Oil Company has been incorporated here, with a capital stock of $50,000, by G. H. Sessions, A. F. Gillmore, F. N. Pellisser, G. E. Platt, and I. T. Henderson.

SACRAMENTO, CAL.—The South Feather Land & Water Company has been incorporated here, with a capital stock of $250,000, by D. S. Wasserman, J. S. Gattman, S. F. McAnear, L. S. Hinsdale, and L. G. Siller.

SAN FRANCISCO, CAL.—The Shoenberg Electric Appliance Company has been incorporated here, with a capital stock of $25,000, by S. G. O. King, J. Goldman, S. J. Goldman, M. Shoenberg, and H. Shoenberg.

SAN FRANCISCO, CAL.—The Altamont Oil Company has been incorporated here, with a capital stock of $1,000,000, by E. F. Eastman, A. F. Taraszthy, Myer Jacobs, Carl Kaufmann, and D. R. Swift.

SAN FRANCISCO, CAL.—The Hog Valley Oil Company has been incorporated here, with a capital stock of $1,000,000, by R. M. Dunlevy, H. L. Allen, and John Neu.

SAN FRANCISCO, CAL.—The Denton Oil Company has been incorporated here, with a capital stock of $100,000, by R. M. Sims, Edwin Schwab, W. C. Webb, Marion Vecki, and C. R. Burnett.

LOS ANGELES, CAL.—The North El Monte Water Company has been incorporated here, with a capital stock of $5,000, by C. J. Pearson and W. J. Embree, of El Monte, and G. M. Pearson, of Riverside.

SAN FRANCISCO, CAL.—The King Keystone Oil Company has made application to change its name to the Monarch Oil Refining Company. The matter will come up in the Superior Court on December 28th.

LOS ANGELES, CAL.—The A. T. Currier Water Company has been incorporated here, with a capital stock of $100,000, by A. T. and Susan Currier, of Spadra, and C. E. Walker, of Pomona.

SAN FRANCISCO, CAL.—The Section Thirty Oil Company has been incorporated here, with a capital stock of $500,000, by W. L. Evans, A. D. Windsor, G. W. Strominger, T. C. Gray, and Paul Kocher. The incorporators have subscribed for $200,000 of the capital stock of the company.

FRESNO, CAL.—The John Kern Oil & Development Company has been incorporated here, with a capital stock of $200,000, by J. J. Kern, C. McCoy, J. J. Pimental, W. M. Barron, and W. D. Crichton.

LOS ANGELES, CAL.—The Santa Gertrudes Water Company has been incorporated here, with a capital stock of $20,000, by D. W. Carlton, B. J. Bradner, and A. E. Bell.

LOS ANGELES, CAL.—Consolidated Reservoir & Power Company has been incorporated here, with a capital stock of $1,000,000, by H. E. Moore, A. E. Poole, G. I. Lamy, Wm. Lane, and others.

TRANSPORTATION

SAN DIEGO, CAL.—Extensions are contemplated by the San Diego Electric Railway Company, on its lines on M Street, National Avenue, and University Heights.

VALLEJO, CAL.—Randall, Trowbridge & Co., real estate men of Oakland, have applied for an electric railway franchise on the chief streets of this city.

STOCKTON, CAL.—Morris L. Brackett, who is backing the Stockton-Modesto electric road, reports that all opposition to the line has been overcome, and that the construction of the line will proceed at once.

FRESNO, CAL.—F. S. Granger, of the proposed Fresno-Hanford Electric Road, says that work on the new line will begin January 1st.